Claim Amendments

Amend the claims as follows:

1. (currently amended) A computer-readable medium containing computer-readable instructions which, when executed by a computer, perform a band model method for computing~~determining and using~~ individual atomic and molecular species spectral transmittances through a gaseous medium from atomic and molecular transition data for a given spectral range and atmospheric conditions, the method comprising the steps of:

~~providing atomic and molecular transition data for a given spectral range and atmospheric conditions;~~

dividing a~~the~~ spectral region into a number of spectral bins that determine a~~the~~ spectral resolution, each bin having a width of less than 1.0 cm^{-1};

calculating atomic and molecular species line center absorption from at least an~~the~~ equivalent width of the atomic and molecular transitions centered within each spectral bin;

calculating line tail absorption within each spectral bin from atomic and molecular transitions not centered within the bin; and

determining atomic and molecular species spectral transmittances for each spectral bin, the spectral transmittance having a value which is a function of at least the calculated line center absorptions and the calculated line tail absorptions.~~; and~~

~~using the spectral transmittances in an analysis of imaging sensors having atmospheric imaging paths.~~

2. (currently amended) The computer-readable medium ~~method~~ of claim 1, wherein the spectral bins have a width of about 0.1 cm^{-1}.

3. (currently amended) The computer-readable medium ~~method~~ of claim 1 wherein the calculating line center absorption step includes calculating, from an exact expansion, a~~the~~ bin Voigt equivalent width of atomic and molecular transitions whose centers lie within the~~each~~ spectral bin.

4. (currently amended) The computer-readable medium ~~method~~ of claim 3, wherein the exact expansion is an exact modified Bessel functions expansion.

5. (currently amended) The computer-readable medium ~~method~~ of claim 3, wherein the calculating line tail absorption step includes subtracting line-tail absorption as calculated from a~~the~~ column strength, a~~the~~ Lorentz half-width, a~~the~~ Doppler half-width, and a~~the~~ line tail spectral displacement.

6. (currently amended) The computer-readable medium ~~method~~ of claim 3, wherein the calculating line center absorption step includes determining a~~the~~ Voigt line-shape function computed at specific frequencies.

7. (currently amended) The computer-readable medium ~~method~~ of claim 1, wherein the line tail calculation step includes calculating line tail absorption within each bin from atomic and molecular transitions centered outside of the bin using Padé approximant spectral fits to Voigt absorption coefficient curves.

8. (currently amended) The computer-readable medium ~~method~~ of claim 7, wherein the line tail absorption calculation step includes determining a database of temperature and pressure dependent Padé approximant spectral fits to Voigt absorption coefficient curves.

9. (currently amended) The computer-readable medium ~~method~~ of claim 8, wherein there are five Padé parameters.

10. (currently amended) The computer-readable medium ~~method~~ of claim 8, wherein Padé parameters are determined from summed line tail spectral absorption coefficients.

11. (currently amended) The computer-readable medium ~~method~~ of claim 10, wherein each bin has a center and two edges, and one Padé parameter is determined at the center of the bin, and one at each edge of the bin.

12. (currently amended) The computer-readable medium ~~method~~ of claim 10, wherein one Padé parameter is the derivative of the absorption coefficient with respect to a~~the~~ normalized spectral variable at the line center.

13. (currently amended) The computer-readable medium ~~method~~ of claim 10, wherein one Padé parameter is the integral of the spectral absorption coefficient over a~~the~~ spectral band.

14. (currently amended) The computer-readable medium ~~method~~ of claim 8, wherein the Padé ~~parameters~~ database is generated for a plurality of temperatures.

15. (currently amended) The computer-readable medium ~~method~~ of claim 8, wherein the Padé ~~parameters~~ database is determined for a plurality of pressures.

16. (currently amended) The computer-readable medium ~~method~~ of claim 1, wherein the line center absorptions are calculated from atomic and molecular transitions centered no more than half a spectral bin width from the bin, and the line tail absorptions are calculated from atomic and molecular transitions not centered within a half spectral bin from the bin.

17. (currently amended) A computer-readable medium containing computer-readable instructions which, when executed by a computer, perform a band model method for computing~~determining and using~~ the contribution of line centers to a~~the~~ determination of individual atomic and molecular species spectral transmittances through a gaseous medium from

atomic and molecular transition data for a given spectral range and atmospheric conditions, the method comprising the steps of:

~~providing atomic and molecular transition data for a given spectral range and atmospheric conditions;~~

dividing a~~the~~ spectral region into a number of spectral bins that determine a~~the~~ spectral resolution, each bin having a width of less than 1.0 cm^{-1};

calculating a~~the~~ bin Voigt equivalent width of atomic and molecular transitions centered within each spectral bin from an exact expansion; and

determining atomic and molecular species spectral transmittances for each spectral bin, the spectral transmittance having a value which is a function of at least the calculated equivalent widths.~~; and~~

~~using the spectral transmittances in an analysis of imaging sensors having atmospheric imaging paths.~~

18. (canceled)

19. (currently amended) The computer-readable medium ~~method~~ of claim 17, wherein the spectral bins have a width of about 0.1 cm^{-1}.

20. (currently amended) The computer-readable medium ~~method~~ of claim 17, wherein the exact expansion is an exact modified Bessel functions expansion.

21. (currently amended) The computer-readable medium ~~method~~ of claim 17, wherein the calculating step includes subtracting line-tail absorption as calculated from a~~the~~ column strength, a~~the~~ Lorentz half-width, a~~the~~ Doppler half-width, and a~~the~~ line tail spectral displacement.

22. (currently amended) The computer-readable medium ~~method~~ of claim 17, wherein the calculating step includes determining a~~the~~ Voigt line-shape function computed at specific spectral frequencies.

23. (currently amended) A computer-readable medium containing computer-readable instructions which, when executed by a computer, perform a method for computing~~determining and using~~ the contribution of line tails to the determination of individual atomic and molecular species spectral transmittances through a gaseous medium from atomic and molecular transition data for a given spectral range and atmospheric conditions, the method comprising the steps of:

~~providing atomic and molecular transition data for a given spectral range and atmospheric conditions;~~

dividing a~~the~~ spectral region into a number of spectral bins that determine a~~the~~ spectral resolution, each bin having a width of less than 1.0 cm^{-1};

calculating line tail absorption within each bin from atomic and molecular transitions centered outside of the bin using Padé approximant spectral fits to Voigt absorption coefficient curves; and

determining atomic and molecular species spectral transmittances for each spectral bin, the spectral transmittance having a value which is a function of at least the calculated line tail absorptions.~~; and~~

~~using the spectral transmittances in an analysis of imaging sensors having atmospheric imaging paths.~~

24. (currently amended) The computer-readable medium ~~method~~ of claim 23, wherein the calculating step includes determining a database of temperature and pressure dependent Padé approximant spectral fits to Voigt absorption coefficient curves.

25. (currently amended) The computer-readable medium ~~method~~ of claim 24, wherein there are five Padé parameters.

26. (currently amended) The computer-readable medium ~~method~~ of claim 24, wherein Padé parameters are determined from summed line tail spectral absorption coefficients.

27. (currently amended) The computer-readable medium ~~method~~ of claim 26, wherein each bin has a center and two edges, and one Padé parameter is determined at the center of the bin, and one at each edge of the bin.

28. (currently amended) The computer-readable medium ~~method~~ of claim 24, wherein one Padé parameter is the derivative of the absorption coefficient with respect to a~~the~~ normalized spectral variable at the line center.

29. (currently amended) The computer-readable medium ~~method~~ of claim 24, wherein one Padé parameter is the integral of the spectral absorption coefficient over a~~the~~ spectral band.

30. (currently amended) The computer-readable medium ~~method~~ of claim 24, wherein the Padé ~~parameter~~ database is generated for a plurality of temperatures.

31. (currently amended) The computer-readable medium ~~method~~ of claim 24, wherein the Padé ~~parameter~~ database is determined for a plurality of pressures.

32. (canceled)

33. (currently amended) The computer-readable medium ~~method~~ of claim 23, wherein the spectral bins have a width of about 0.1 cm^{-1}.